

**REMARKS**

Claims 1, 3, 4, 6-15 and 17-20 are all the claims presently pending in the application. Previously pending claims 1, 3, 4, 6-15, 17 and 18 have not been amended. Claims 19 and 20 have been added to provide more varied protection for the claimed invention and to claim additional features of the invention.

Claims 1, 3, 4, 6-15, 17 and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tischler et al. (U.S. Patent Application Publication No. 2002/0028314; hereinafter "Tischler") in view of Shibata et al. (U.S. Patent No. 6,824,610; hereinafter "Shibata").

This rejection is respectfully traversed in the following discussion.

**I. THE CLAIMED INVENTION**

The claimed invention of exemplary claim 1, provides a method of producing a Group III nitride compound semiconductor substrate including forming a first Group III nitride compound semiconductor layer by a halide vapor-phase epitaxy method directly on a silicon (Si) substrate or after forming a buffer layer on said silicon substrate and forming a second Group III nitride compound semiconductor layer by a halide vapor-phase epitaxy method at a temperature of not lower than 1000°C after removing substantially the whole of the silicon substrate (e.g., see Application at page 7, lines 20-25). This feature is important for relaxing the stress between the silicon substrate and the first Group III nitride compound semiconductor so that the stress is substantially absent (see Application at page 6, lines 5-18).

## II. THE PRIOR ART REFERENCES

The Examiner alleges that the claimed invention of claims 1, 3, 4, 6-15, and 17-20 would have been obvious over Tischler in view of Shibata. Applicants submit, however, that these references would not have been combined as alleged by the Examiner and that, even if combined, the alleged combination of references would not teach or suggest each and every feature of the claimed invention.

That is, Tischler does not teach or suggest (nor make obvious) “*forming a second Group III nitride compound semiconductor layer by a halide vapor-phase epitaxy method at a temperature of not lower than 1000°C after said removing substantially the whole of said silicon substrate*”, as recited in claim 1, and similarly recited in claims 8, 9 and 19.

Indeed, the Examiner does not even allege that Tischler teaches or suggests this feature of the claimed invention.

The Examiner maintains that (even though the Examiner changed the basis of his rejection) that this feature of the claimed invention would have been obvious in view of the teachings of Tischler.

The claimed invention recites forming a first Group III nitride compound semiconductor layer at first temperature and then forming a second Group III nitride compound semiconductor at a second temperature, which is different from the first temperature. This feature is not taught or suggested (nor made obvious) by Tischler.

Indeed, Tischler does not even teach or suggest forming a second Group III nitride compound semiconductor layer. The Examiner alleges that this feature is taught in paragraph [0051] of Tischler. The Examiner, however, is clearly incorrect.

This passage of Tischler does not teach or suggest forming a second Group III nitride compound semiconductor layer. Paragraph [0051] of Tischler merely discusses known techniques for forming Group III nitride compound layers.

Furthermore, nowhere does Tischler teach or suggest forming a first Group III nitride compound semiconductor layer and a second Group III nitride compound semiconductor layer at different temperatures, let alone at the specific temperature ranges recited in the claimed invention.

Therefore, in summary, Tischler does not teach or suggest (1) forming more than one Group III nitride compound semiconductor layer; (2) forming more than one Group III nitride compound semiconductor at more than one temperature; and (3) forming more than one Group III nitride compound semiconductor at the specific temperatures recited in the claimed invention.

Indeed, the Examiner concedes that “Tischler 314 does not outright explicitly teach the first layer of the metal-nitride semiconductor being processed at a temperature of 800-900°C and the second layer of metal-nitride material (i.e., Group III in particular) manufactured at a temperature of not lower than 1000°C” (see Office Action dated April 2, 2007 at page 5).

The Examiner erroneously alleges, however, that “Tischler 314 does teach that the compound semiconductor is manufactured in the range of 800-1300 °C denoting that it would be conceivable to one having ordinary skill in the art at the time of the invention via routine experimentation to produce the structure at a variety of temperature levels and ranges depending on the state of the layer manufacture for the compound semiconductor device. There is nothing precluding in this reference or applicant’s remarks that would suggest one having ordinary skill in the art at the time of the invention would not understand or conceive of the process as claimed by applicant” (see Office Action dated April 2, 2007 at page 6). The Examiner, however, is clearly incorrect.

That is, Applicants again point out that the Examiners’ above reasoning is flawed for several reasons, which are detailed below. Indeed, the Examiner appears to be applying an

erroneous standard for establishing obviousness of the claimed invention. Specifically, the Examiner's above reasoning does not appear to be supported by any known source of U.S. patent law.

First, the Examiner's allegations regarding "routine experimentation" are erroneous. That is, the M.P.E.P. sets forth that "[w]here general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation" (see M.P.E.P. §2144.05). This standard, however, does not apply to the Examiner's rejection of the claimed invention.

That is, Tischler does not disclose the general conditions of the claim. Indeed, the Examiner is not merely alleging that Tischler teaches all of the process steps recited in the claimed invention and that routine experimentation would have established the specific temperature ranges recited in the claimed invention. In stark contrast, the Examiner is alleging that the actual steps in the process (e.g., forming a second Group III semiconductor layer at a second temperature) would have been obvious via routine experimentation. That is, the Examiner is alleging that the general conditions of the claim would have been obvious via routine experimentation.

Thus, the Examiner's reasoning is clearly inconsistent with the above standard.

Moreover, even assuming, *arguendo*, that the Examiner's application of the above standard was appropriate, the Examiner still has not established a *prima facie* case of obviousness.

That is, the M.P.E.P. clearly sets forth that "[a] particular parameter must first be recognized as a result-effective variable, i.e., **a variable which achieves a recognized result**, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation" (e.g., see M.P.E.P. § 2144.05; emphasis added). The Examiner has not established (indeed the Examiner has not even attempted to establish)

that the features of the claimed invention are result-effective variables. Indeed, the cited references do not suggest any result as being affected by the Group III semiconductor layer forming temperatures, let alone for the desired results on the claimed invention.

Furthermore, Applicants submit that the Examiner has failed to establish a *prima facie* case of obviousness.

That is, when formulating a rejection under 35 U.S.C. § 103(a) based upon an alleged combination of prior art elements, it is necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed. To facilitate review, the Examiner's analysis and reasoning should be made explicit. The Examiner has clearly failed to meet this well-known standard for establishing obviousness.

First, the Examiner has not even provided any reason why one of ordinary skill in the art would have modified Tischler. Therefore, since the Examiner has not even provided a reason to modify the reference, the Examiner has clearly failed to establish a *prima facie* case of obviousness.

Second, as detailed above, Tischler (even if modified) fails to teach or suggest each and every feature of the claimed invention. That is, Tischler merely teaches forming a single Group III semiconductor layer at a temperature selected in a range from 800°C to 1300°C. Nowhere does Tischler teach or suggest forming more than one layer at more than one temperature.

Therefore, the Examiner has clearly failed to meet the requirements for establishing a *prima facie* case of obviousness.

Indeed, the Examiner merely alleges that “[t]here is nothing precluding in this reference or applicant’s remarks that would suggest one having ordinary skill in the art at the time of the invention would not understand or conceive of the process as claimed by

applicant” (see Office Action dated April 2, 2007 at page 6). Applicants point out that this allegation by the Examiner does not conform to any known obviousness standard.

That is, when determining patentability of a claimed invention, with respect to 35 U.S.C. § 103(a), the Examiner must consider “if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made” (see 35 U.S.C. §103(a); emphasis added).

The Examiner alleges that it would have been “conceivable” through routine experimentation to produce the claimed invention. Similarly, the Examiner alleges that “[t]here is nothing precluding in this reference or applicant’s remarks that would suggest one having ordinary skill in the art at the time of the invention would not understand or conceive of the process as claimed by applicant” (see Office Action dated December 15, 2006 at page 7; emphasis added).

Applicants submit, however, that whether one skilled in the art would have “understood” the invention or whether it would be “conceivable” for the one of ordinary skill in the art to modify the teachings of Tischler are immaterial to establishing a rejection of the claimed invention under 35 U.S.C. §103(a). Indeed, the Examiner must establish that the alleged modification would have been obvious.

Furthermore, Applicants submit that the Examiner’s statement that “[t]here is nothing precluding in this reference or applicant’s remarks...” is also immaterial to establishing a *prima facie* case of obviousness. That is, the standard for establishing obviousness is not whether the alleged modification is precluded by the cited reference or the Application, but whether the alleged modification would have been obvious in view of the teachings of the cited reference(s).

Indeed, when attempting to establish a *prima facie* case of obviousness “[k]nowledge of applicant’s disclosure must be put aside in reaching this determination”.

Indeed, “impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of facts gleaned from the prior art” (see M.P.E.P. §2142). The Examiner’s above rationale is a clear example of impermissible hindsight reasoning.

Moreover, if the Examiner continues to apply the above “standards” for obviousness, Applicants again request the Examiner to provide support for his reasoning and applied standards (e.g., specifically the Examiners’ reasoning at page 6 of the Office Action dated April 2, 2007). Applicants point out that the above request was previously made to the Examiner in the Amendment filed on March 13, 2007. Surprisingly, however, the Examiner applied the same erroneous reasoning without responding to Applicants’ request.

Finally, in his rejection, the Examiner has merely paraphrased the claimed invention. While the Examiner’s paraphrased discussion may relate to the teachings of Tischler, it does not accurately and completely explain the claimed invention. Therefore, if the Examiner wishes to maintain this rejection, Applicants again request the Examiner to address each and every feature of the claimed invention and to address the plain meaning of the claimed invention. Applicants point out that the above request was previously made to the Examiner in the Amendment filed on March 13, 2007. Surprisingly, however, the Examiner maintained the same rejection without responding to Applicants’ request.

Applicants point out that each of the above traversal arguments have been previously pointed out to the Examiner. If the Examiner wishes to maintain his rejection of the claims Applicants submit that the Examiner must respond to each of our traversal arguments.

Alternatively, the Examiner has alleged that Shibata would have been combined with Tischler to teach or suggest the claimed invention. Applicants submit, however, that Shibata would not have been combined with Tischler as alleged by the Examiner.

Indeed, Applicants submit that the Examiner continues to misunderstand the requirements for establishing a *prima facie* case of obviousness.

That is, as indicated above, the standard for establishing a *prima facie* case of obviousness is well established. Indeed, when formulating a rejection under 35 U.S.C. § 103(a) based upon an alleged combination of prior art elements, it is necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed. To facilitate review, the Examiner's analysis and reasoning should be made explicit.

The Examiner alleges that it would have been "obvious to one having ordinary skill in the art at the time of the present invention to incorporate the teachings of Shibata 610 into that of Tischler 314 in order to showcase and highlight further various well known processing techniques in fabricating the GaN structures and in particular render that from the known teachings of Tischler 314 that it is obvious from the basic processing parameters to further develop various ways of growing the structures as highlighted by the multiple examples showcased in Shibata in 610." (See Office Action dated April 2, 2007 at page 7).

However, Applicants point out that the Examiner's alleged motivation again fails to comply with any known standard for establishing a *prima facie* case of obviousness.

Indeed, even assuming, *arguendo*, that Shibata teaches various processing techniques, the Examiner has failed to provide any reasoning for one skilled in the art to modify the process of Tischler to include the processing techniques allegedly disclosed in Shibata. It is well established that when attempting to establish a *prima facie* case of obviousness, it is not enough for the Examiner to merely provide a number of references which each teach or suggest "well known" features. The Examiner must provide reasoning explaining why one of ordinary skill in the art would have combined the teachings of the references. The Examiner has failed to do so in this rejection.

Moreover, Shibata (see Examples 9-11 and 13, which were relied upon by the Examiner) teaches forming a GaN layer and then forming an AlN layer. In stark contrast,



however, Tischler is specifically directed to forming a GaN substrate, not an AlN layer. Accordingly, one of ordinary skill in the art would not have combined the teachings of Shibata, which are directed to forming a combination of AlN and GaN layers, in the process of Tischler.

Furthermore, Applicants submit that the Examiner's alleged motivation would change the principle of operation of Tischler. Applicants point out that M.P.E.P. § 2143.01 states: "If the proposed modification or combination of the prior art would change the principal of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious." Therefore, in addition to the reasons set forth above, one of ordinary skill in the art would not have combined Shibata with Tischler.

Thus, Shibata clearly fails to make up the deficiencies of Tischler.

Therefore, Applicants submit that these references would not have been combined as alleged by the Examiner. Accordingly, the Examiner is respectfully requested to reconsider and withdraw this rejection.

### **III. WITHDRAWAL OF FINALITY OF OFFICE ACTION**

On April 4, 2007 Applicants' representative contacted the Examiner regarding the finality of the Office Action dated April 2, 2007. Applicants' representative pointed out that the finality of the rejection was premature. Specifically, Applicants' representative pointed out that the Examiner issued a new rejection, which was not necessitated by amendments to the claims. Indeed, the claims were not amended in the previous amendment.

The Examiner maintained that the finality of the rejection was proper, arguing that that the Office Action did not include a new grounds of rejection (which is clearly erroneous as the Examiner applied a new reference in his rejection).

Since the Examiner's allegations were clearly erroneous and the finality of the Office Action dated April 2, 2007 was clearly erroneous, Applicants filed a Petition to Withdraw Finality of the Office Action on April 5, 2007.

Applicants point out that Decision was issued on the Petition on April 26, 2007. The Decision indicated that the Finality of the Office Action dated April 2, 2007 was premature. Accordingly, Applicants' petition was granted and the finality of the Office Action has been withdrawn.

#### **IV. FORMAL MATTERS AND CONCLUSION**

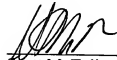
In view of the foregoing, Applicants submit that claims 1, 3, 4, 6-15 and 17-20, all of the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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